Lab 6, Ground Floor, Fr. Roque Ruaño Bldg., España Boulevard, Sampaloc, Manila, Philippines 1500
(632)406-1611 loc. 8516

EXPERIMENT NO. 5
INVESTIGATION OF FORCED VORTICES

INTRODUCTION:

A vortex is a spinning, often turbulent, flow of fluid. Any spiral motion with closed streamlines is vortex flow. The motion of the fluid swirling rapidly around a center is called a vortex. The speed and rate of rotation of the fluid in a free vortex are greatest at the center, and decrease progressively with distance from the center, whereas the speed of a forced (rotational) vortex is zero at the center and increases proportional to the distance from the center. Both types of vortex exhibit a pressure minimum at the center, though the pressure minimum in a free vortex is much lower.

OBJECTIVE:

This experiment aims;

- to determine the surface profile of force vortex and compare it with theoretical values.

APPARATUS AND SUPPLIES:

Hydraulics bench
Cylinder
Paddle and Measuring Needle
F1-23

PROCEDURE:

1. Place the F1-23 on the top of the Hydraulics Bench, over the flow channel, with the valve facing towards the volumetric tank. Adjust the feet until the bubble is central in the level.
2. Connect the hose with the y-divider and two quick-release fittings to the unit, so the flow is directed in the outlet on the bench into the two 9mm inlets. Arrange the outlet hose so that the end is in the lowest art of the volumetric tank and ensure that the outlet valve is fully open. Disconnect the quick-release connector from the valve inlet.
3. Press the bung with central shaft into the orifice. In the base of the cylinder and locate the paddle on the top of the shaft. Locate the bridge piece on the top of the cylinder, with the measuring needles inserted.
4. Switch on the Hydraulics bench and adjust the control valve until there is a reasonable flow into the cylinder. Lift the end of the outlet tube until the hose fills with water. Hold the hose until the cylinder contains the required level then put the hose back into the bottom of the volumetric tank. It is important that the hose is completely full of water, so that a siphoning effect is induced. Close the control valve until the level is steady. If a greater outflow is required, this can be achieved by pushing the end of the outlet hose through the drain hole and into the slump tank.
5. Adjust the position of each of the measuring needles until they just contact the surface of the vortex. Remove the bridge and record the length of the needles.
6. Measure the rotational speed of the vortex by counting the number of revolutions the paddle makes in a timed period.
7. Repeat the test for a number of speeds.

DATA AND RESULTS:

Table 5.1 – Investigation of Forced Vortices

TRIAL	No. of Rev. (n)	Time, t (sec)	Rev/sec	Radius, x m	Measured height, y (m)	Calculated height, y (m)	Percent Error, %
1							
2							

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Year and Section		**Date Started**	
Group Number		**Date Finished**	
Group Members		**Date Submitted**	

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5.1 DATA AND RESULTS:

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5.2 FORMULAS AND COMPUTATIONS:

5.3 DRAWINGS/SKETCHES/DIAGRAMS/GRAPHS:

5.4 SOURCES OF ERRORS:

5.5 REMARKS/CONCLUSION: